# Numair Khan

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**RESEARCH**

My research focuses on methods and representations for scene reconstruction and multi-view imaging for computational photography applications.

**EDUCATION**

**Brown University**, Providence, RI
– PhD in Computer Science, with Prof. James Tompkin                    2016 – 2022
  *Thesis*: Are Multi-view Edges Incomplete?
– MS in Computer Science                    2016 – 2018

**Courant Institute, New York University**, New York, NY
– MS in Computer Science, with Prof. Ken Perlin                    2012 – 2014
  *Master's Thesis*: Multi-level Procedural Terrain Rendering

**Lahore University of Management Sciences**, Lahore, Pakistan
– BSc (Honors) in Computer Science                    2005 – 2009

**HONORS/ AWARDS**

Associate Member of Sigma Xi                    2022 – present
Fulbright Scholarship                    2012 – 2014
NYU Master's Thesis Research Fellowship                    2013
Brown Graduate School Fellowship                    2016 – 2017

**PUBLICATIONS**

**N. Khan**, E. Penner, D. Lanman, L. Xiao, "Temporally-Consistent Online Depth Estimation Using Point-Based Fusion," *Computer Vision and Pattern Recognition (CVPR)*, Jun 2023.

**N. Khan**, L. Xiao, D. Lanman, "Tiled Multiplane Images for Practical 3D Photography," *In submission*.

**N. Khan**, M. Kim, J. Tompkin "Are Multi-view Edges Complete for Depth Estimation," *In submission*,

Y. Xie, T. Takikawa, S. Saito, O. Litany, S. Yan, **N. Khan**, F. Tombari, J. Tompkin, V. Sitzmann, S. Sridhar, "Neural Fields in Visual Computing and Beyond," *Eurographics STARs*, Apr 2022.

**N. Khan**, M. Kim, and J. Tompkin, "Differentiable Diffusion for Dense Depth Estimation from Multi-view Images," *Computer Vision and Pattern Recognition (CVPR)*, Jun 2021.

**N. Khan**, M. Kim, and J. Tompkin, "Edge-aware Bidirectional Diffusion for Dense Depth Estimation from Light Fields," *British Machine Vision Conference (BMVC)*, Nov 2021.

**N. Khan**, M. Kim, and J. Tompkin, "View-Consistent 4D Light Field Depth Estimation," *British Machine Vision Conference (BMVC)*, Apr 2020.

**N. Khan**, Q. Zhang, L. Kasser, H. Stone, M. Kim, and J. Tompkin, "View-Consistent 4D Light Field Superpixel Segmentation," *International Conference on Computer Vision (ICCV)*, Nov 2019.
(Oral Presentation)

**N. Khan**, and A. Rahman, "Rethinking the Mini-Map: A Navigational Aid to Support Spatial Learning in Urban Game Environments," *International Journal of Human-Computer Interaction* 34(12), pp. 1135–1147, Dec 2017.

M. Nasim, A. Rextin, S. Hayat, **N. Khan**, and M. Malik, "Data Analysis and Call Prediction on Dyadic Data from an Understudied Population," *Pervasive and Mobile Computing* 41, pp. 166–178, Oct 2017.

**N. Khan**, and M. Zahran, "Space-Efficient Pointwise Computation of the Distance Transform on GPUs," *2017 IEEE International Parallel and Distributed Processing Symposium Workshops (IPDPSW)*, pp. 557–566, May 2017.

M. Nasim, A. Rextin, **N. Khan**, and M. Malik, "Understanding Call Logs of Smartphone Users for Making Future Calls," *Proc. 18th International Conference on Human-Computer Interaction with Mobile Devices and Services (MobileHCI'16)*, ACM, New York, pp. 483–490, Sep 2016.

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| **PATENTS** | Neural View Synthesis Using Tiled Multiplane Images. |

Temporally Consistent Depth Estimation Using Point-based Fusion.

High-Definition View Synthesis for Real-Time Applications.

A Method for Facial Un-Distortion in Selfie Photos.

**TALKS**

"View-Consistent Light Field Superpixels," at the Korean Advanced Institute of Science and Technology (KAIST), Oct 2019.

"Augmented Reality for Learning and Education," The 11th Annual Fulbright and Humphrey Alumni Conference, Lahore, Pakistan. Dec 2014.

**MAGAZINE ARTICLES**

**N. Khan**, "In Search of a Strategy Against Misinformation," *ACM XRDS* 27(1), pp. 8–9, 2020.

**N. Khan**, A. Penu, T. Dickerson, L. Liukas, C. Jung-Harada, S. Bhattacharya, "I, Entrepreneur," *ACM XRDS* 23(4), pp. 50–53, 2017.

**N. Khan**, "The Essentials of a Computer Scientist's Toolkit," *ACM XRDS* 21(2), pp. 9–9, 2014.

**INDUSTRY EXPERIENCE**

**Research Scientist**, Meta                                                                Feb 2022–present

**Research Intern**, Snap Inc.                                                         Jun 2021–Aug 2021
– Worked with Prof. Shree Nayar, Director of Research at the Computational Imaging Lab.
– Developed an efficient Multi-Plane Image (MPI) representation for view synthesis at >1080p and 140 FPS.

**Research Intern**, Samsung Research America                                Mar 2021–May 2021
– Developed a method for perspective undistortion of selfie photos using a stereo camera.
– Trained facial reconstruction from distorted images by observing how 3DMM faces distort a real-world dataset.

**Founder/Mobile Game Developer**, The Kinematic Laboratory        Mar 2010–Apr 2012
– Released six game titles on the iPhone App Store.
– Developed *Flood Rescue*, a game which became the highest ranked app in Pakistan, the second-highest ranked app in India, and a top-ten app in four other countries.

**Mobile Game Developer**, Tintash Inc., Pakistan                          Jul 2009 – Mar 2010
– Developed level designer for the iPhone game *Super Slyder*.
– Led development on two additional iPhone games.

**Software Developer**, Techlogix Pvt. Ltd, Pakistan                        Sep 2009–Mar 2010
– Gained experience developing enterprise software as part of a global team.
– Led the integration phase in the deployment of Oracle's FLEXCUBE service for a national bank.

**OPEN-SOURCE SOFTWARE**

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| Light Field Superpixel Segmentation | https://github.com/brownvc/lightfieldsuperpixels |
| Light Field Depth Estimation | https://github.com/brownvc/lightfielddepth |
| Differentiable Diffusion for Dense Depth Estimation | https://github.com/brownvc/diffdiffdepth |

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| **TEACHING EXPERIENCE** | **Teaching Assistant**, Brown University | |
| | Computational Photography | Fall 2018, Fall 2020 |
| | Advanced Computer Graphics | Spring 2018 |
| | **Visiting Faculty**, National University of Science and Technology, Pakistan | |
| | Advanced Programming | Spring 2016 |
| | Operating Systems | Fall 2015 |
| | **Grader**, New York University | |
| | Fundamental Algorithms | Fall 2013 |
| | **Volunteer Tutor**, SOS Village, Rawalpindi, Pakistan | |
| | High school mathematics and physics | Nov 2014 – Apr 2015 |

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| **TEACHING DEVELOPMENT** | **Certificate I: Reflective Teaching** <br> Sheridan Center for Teaching, Brown University | May 2018 |
| | **Certificate II: Course Design** <br> Sheridan Center for Teaching, Brown University | May 2019 |

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| **MENTORING** | Undergraduate, James Washington, Morehouse College | 2021 |
| | – As part of Google's ExploreCSR program for Socially Responsible AI for Computational Creativitity | |
| | Masters, Kanchita Klangboonkrong, Brown University | 2021 |
| | PhD, Abdul Manan, Brown University | 2021 |
| | PhD, Ghulam Murtaza, Brown University | 2019 |
| | PhD, Charles Lovering, Brown University | 2018 |
| | High School Senior, Jarrod Hill, North Smithfield High School, Rhode Island, USA | 2018 |
| | High School Senior, Lauren Cenedella, North Smithfield High School, Rhode Island, USA | 2017 |

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| **SERVICE** | Reviewer, IEEE Transactions on Visualization and Computer Graphics | 2022 |
| | Reviewer, IEEE Transactions on Image Processing | 2022 |
| | Reviewer, International Conference on 3D Vision (3DV) | 2021 |
| | Reviewer, IEEE Transactions on Computational Imaging | 2021 |
| | Feature Editor, ACM Crossroads (XRDS) magazine, | 2014–2021 |
| | Reviewer, Pacific Graphics | 2020 |
| | Lead Editor, ACM XRDS:CrossRoads, Volume 27, No. 1 | 2020 |
| | Lead Editor, ACM XRDS:CrossRoads, Volume 25, No. 1 | 2018 |
| | Judge at the North Smithfield High School senior project presentations | 2018 |
| | Lead Editor, ACM XRDS:CrossRoads, Volume 23, No. 4 | 2017 |
| | Lead Editor, ACM XRDS:CrossRoads, Volume 22, No. 3 | 2016 |
| | Member of the interview panel for the USEFP global undergraduate exchange program | 2015 |

| **SKILLS** | **Programming** | **APIs/SDKs** | **Software** |
|---|---|---|---|
| | C/C++, Java, C# Python, MATLAB, Objective-C, JavaScript | PyTorch, Keras, TensorFlow, CUDA, OpenCV, OpenGL | Unity3D, Maya, Photoshop, Premiere |